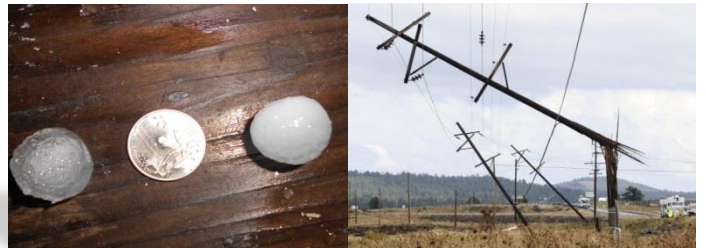


## What is the difference between a Watch, Warning, and Advisory?

<b><i>Watch</i></b>	A significant weather event is possible but occurrence, location, and/or timing is still uncertain. Often issued 36 to 72 hours in advance of impacting weather, but may be issued only a few hours in advance for localized events such as tornadoes, severe thunderstorms, and flash floods where exact timing and/or location remain uncertain until the weather event starts.
<b><i>Warning</i></b>	A specific weather event is occurring, or is about to occur, and is significant enough to pose a <b>danger to life and property</b> .
<b><i>Advisory</i></b>	A specific weather event is occurring or is expected to occur, and may be an inconvenience to those affected.

### What prompts a Severe Thunderstorm warning or a Tornado Warning?

A ***Severe Thunderstorm Warning*** is issued when a storm is expected to produce damaging wind gusts in excess of 58 mph and/or hail greater than or equal to one inch in diameter. Warnings may be issued based on radar or reported visual accounts. When a Severe Thunderstorm Warning is issued, seek shelter immediately.



A ***Tornado Warning*** is issued when a tornado is forming, expected to form, or reported to have touched down. Tornado warnings are often based on radar indication of strong rotation within a thunderstorm, or by eye witness accounts of wall clouds or funnel clouds (Note: a wall cloud is a persistent and sometimes rotating cloud feature hanging below the base of a thunderstorm, which often precedes development of a tornado by a few minutes to nearly an hour). When a tornado warning is issued, it means tornado danger is imminent and you need



to seek safe shelter immediately.

### What about Flash Flood Warnings?

A ***Flash Flood Warning*** is issued when a flash flood is imminent or occurring in the warned area. A flash flood is a sudden, often violent flood near or downstream of a heavy rain. Rainfall intensity and duration, topography, soil conditions, and ground cover conditions contribute to flash flooding.



## What is the difference between a Winter Weather Advisory and a Winter Storm Warning?

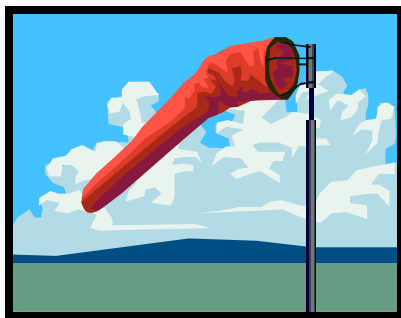
<p><b>Winter Weather Advisory</b></p> 	<p>Issued when snowfall is expected to meet or exceed one of the criteria listed below; Or when snow, blowing snow, and/or freezing rain is expected to have a significant impact on travel or daily life.</p> <p><u>5000 feet and above</u> : 4-8 inches storm total snow accumulation expected.</p> <p><u>Below 5000 feet</u>: 2-4 inches storm total snow accumulation expected.</p> <p>(Note: Criteria vary by geographic region. The above are for northern Arizona.)</p>
<p><b>Winter Storm Warning</b></p> 	<p>Issued when snowfall is expected to meet or exceed one of the criteria listed below; Or when snow, blowing snow, and/or freezing rain may pose a <b>danger to life and property</b>.</p> <p><u>5000 feet and above</u>: 8 inches or greater storm total snow accumulation.</p> <p><u>Below 5000 feet</u>: 4 inches or greater storm total snow accumulation.</p> <p>(Note: Criteria vary by geographic region. The above are for northern Arizona.)</p>

## What about Blizzard warnings?

The primary difference between a winter storm and a blizzard is wind. A blizzard requires sustained winds or frequent gusts of at least 35 mph, combined with visibilities below  $\frac{1}{4}$  mile in heavy snow or blowing snow. If these conditions are expected to exist for at least 3 consecutive hours, a **Blizzard Warning** is issued.



## What is the difference between a High Wind Warning and a Wind Advisory?



A **Wind Advisory** is issued when sustained winds of 30-39 mph are expected for at least one hour, or wind gusts of 40-57 mph are expected. A **High Wind Warning** is issued when exceptionally strong winds are expected which may pose a **threat to life or property**; specifically when sustained winds greater than 40 mph are expected for at least one hour, or wind gusts of at least 58 mph are expected.

## What is a Red Flag Warning?

A **Red Flag Warning** is issued when a combination of high fire danger, strong winds, and low relative humidity is expected. These three ingredients prove favorable for dangerous fire behavior and potentially rapid fire growth. A **Fire Weather Watch** is issued when Red Flag conditions are possible, but occurrence, location, and/or timing is still uncertain. A Fire Weather Watch is typically issued 24 to 96 hours in advance of Red Flag Conditions.



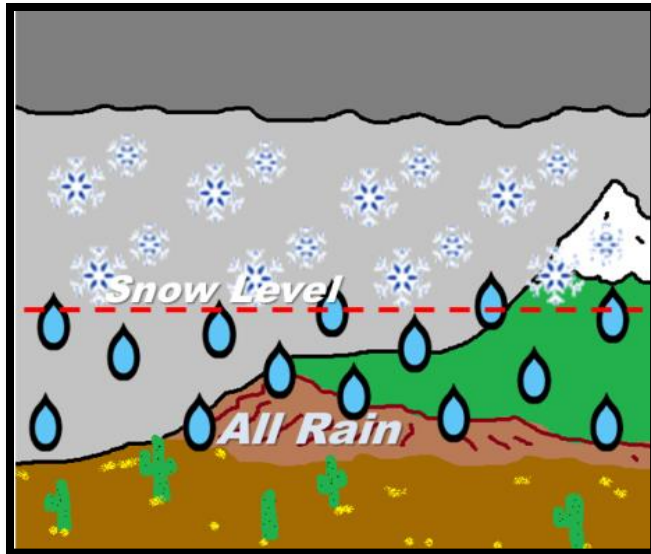
## What is the difference between breezy and windy conditions?

Breezy conditions are sustained winds between 15 and 22 mph. Windy conditions are sustained winds between 23 and 30 mph.

## What is meant by wind direction?

Wind direction is defined as the direction the wind is coming from. For example, a South wind would be blowing out of the south, towards the north. Variable winds are typically light winds which may shift erratically throughout the day.

## What is the snow level?



We often reference a snow level in our wintertime forecasts to indicate which areas may see snowfall and which will receive rain. Snow level is defined as the lowest elevation at which snow reaches before melting completely. Just above the snow level, a mix of rain and snow is often found.

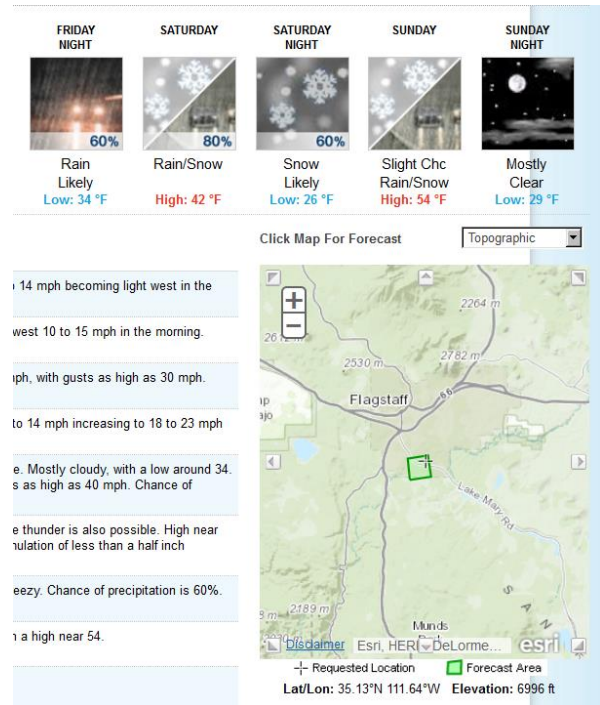
As an example, with a snow level of 6500 feet, you would witness all rain at 6400 feet, likely a mix of rain and snow at 6700 feet, and typically all snow above 7000 feet.

Depending on the situation, snow may not accumulate for several hundred or even a few thousand feet above the snow level.

## How can you find your elevation?

With the snow level often referenced in forecasts, how do you find out if your location is above or below that level? At [weather.gov/flagstaff](http://weather.gov/flagstaff), you can click on the map to get a forecast at that location. You will see a zoomed-in map of the area you clicked, with the exact location you clicked highlighted in green. You can click on this map to refine the exact point you want to select. Directly below the map, the latitude and longitude, as well as the approximate elevation will be listed.

For reference, the elevation of select cities in Northern Arizona is listed below:



<i>Location</i>	<i>Elevation (ft)</i>
Arizona Snowbowl	
Upper Base	11,500
Lower base	9,200
Pinetop-Lakeside	~7,000
Grand Canyon S. Rim	6,996
Flagstaff	6,986
Window Rock	6,875
Williams	6,796
Munds Park	6,596
Show Low	6,396
Chinle	5,497
Prescott	5,399
Seligman	5,343
Ash Fork	5,199
Prescott Valley	4,999
Payson	4,999
Sedona	4,362
Page	4,215
Cottonwood	3,428
Camp Verde	3,198



## What Does Chance of Precipitation Mean?

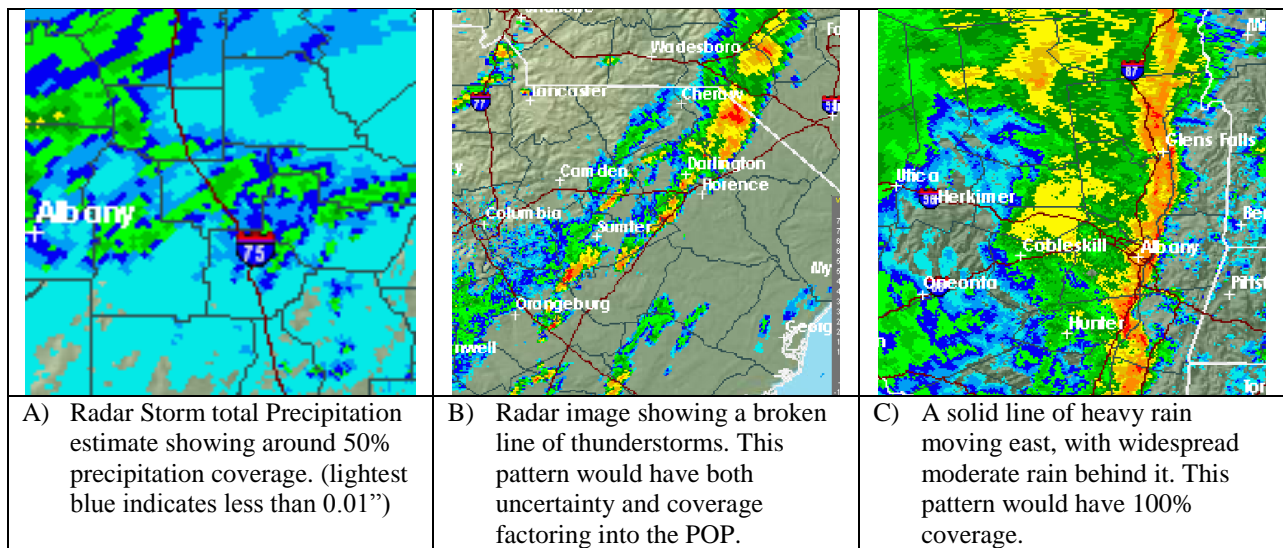
### Definition

One of the main elements of a forecast is the “Chance of Precipitation”, otherwise referred to as “Probability of Precipitation” or “POP” for short. This is defined as **“The likelihood, expressed as a percent, of a measurable precipitation event (0.01 inches or greater) at a particular point during a specified time period.”** *Precipitation* can be any liquid or frozen type of precipitation, such as rain, drizzle, snow, sleet, hail, etc. For all precipitation types, when we refer to “measurable” precipitation, we are referring to the amount when it is melted down to water. One hundredth, or 0.01 inches, is the minimum amount of precipitation that is measurable with standard methods. Anything less is referred to as a “Trace” and does not count as measurable precipitation according to definition.

The probability of precipitation you see in forecasts accounts for both the likelihood of a precipitation event occurring, and the expected coverage of the event. Sometimes the likelihood of precipitation in an area is nearly 100%, but the coverage of precipitation will be much less than 100%. Thunderstorms in the summer in northern Arizona are an example where the chance of precipitation occurring in the region is near 100%, but the coverage might only be 30%. A 30% POP would be the result. Other times, a winter storm system that is possible days in the future might bring 100% precipitation coverage to the region, but the development, track, and timing of the system are still uncertain. Again, a 30% POP would result.

### Examples

Now let’s see some examples of POP. Suppose that thunderstorms are nearly certain (100% likelihood) to develop, but the rain coverage of these storms is only expected to be 50% of the area. This situation would lead to a POP of 50% in the forecast ( $1.0 \times 0.50 = 0.50$ , or 50%) and the chance of precipitation at any given point is 50%. See Figure A below. Now let’s imagine it is uncertain whether the thunderstorms will form at all (60% likelihood), and that coverage would be only 30% if they do form. In this case, the POP would be 60% of 30%, or 18% (mathematically,  $0.60 \times 0.30 = 0.18$ ). This would round to a forecast POP of 20%. See Figure B below. Finally, we could imagine a widespread precipitation event (100% coverage) that has a 60% chance of occurring several days in the future. This would have a forecast pop of 60% because there would be a 60% chance of any given location receiving precipitation. However, as the storm approaches, the POP might increase as the certainty of storm development increases. See Figure C below.



## Why Do Forecasts Sometimes Use Words Like “Isolated” and “Scattered” instead of “Chance of” and What Do These Terms Mean?

Sometimes forecasts use terms like “Slight Chance,” “Scattered,” “Isolated,” or “Likely” when referring to precipitation. What do these terms mean and why are they used? These are referred to as “Chance” and “Coverage” terms and are intended to help convey the chance/likelihood or coverage/distribution of a precipitation event.

The **chance** terms used in forecasts are:

Term	POP value
Slight Chance	10% to 20%
Chance	30% to 50%
Likely	60% to 70%

Note: POP values in forecasts are always rounded to the nearest 10 percent

Chance terms are often used in the extended periods of a forecast without the corresponding POP value, so it is good to remember what these terms mean. In shorter term forecasts, they are used in conjunction with a POP value to help describe the precipitation type and likelihood, but they do not imply anything about the areal coverage. An example of a forecast using these terms would be:

*Thursday...* **Rain and snow showers likely**, mainly before noon. Snow level 5000 feet. Mostly cloudy, with a high near 39. Breezy. **Chance of precipitation is 60%**. New snow accumulation of less than a half inch possible.

The **coverage** terms used in forecasts are:

Term	POP Value
Isolated	10% to 20%
Scattered	30% to 50%
Numerous	60% to 70%

Note: POP values in forecasts are always rounded to the nearest 10 percent

Coverage terms are generally used only in the earlier periods of a forecast to imply a convective or non-uniform precipitation distribution. An example of a forecast using coverage terms would be:

*Today...* **Scattered thunderstorms**, mainly after noon. Mostly cloudy, with a high near 82. Southwest wind 5 to 8 mph. **Chance of precipitation is 40%**.

If a forecast of precipitation does not include chance or coverage terms, it means that the chances of precipitation are very likely, or *categorical*. POP values for categorical precipitation are 80% to 100%. An example of this type of a forecast is the following:

*Today...* **Showers and thunderstorms**. Cloudy, with a high near 66. Breezy with a southwest wind around 18 mph. **Chance of precipitation is 90%**.



Photo courtesy of NOAA/DOC.  
Photograph by Ralph F. Kresg

## Aren't "Partly Sunny" and "Mostly Cloudy" the same thing?

Yes, sort of...

National Weather Service meteorologists actually forecast a cloud cover percentage, which then is translated to a cloud cover description you see in forecasts. For a completely cloudless sky, the percentage is 0. A totally cloud filled sky would be 100%, as long as the cloud cover is thick enough to obscure the sun. This percentage is then translated to one of many different descriptive terms, which vary depending on time of day (for example, the term "Sunny" would never be used at night!). The sky description terms are shown below:

Cloud Cover percentage	Daytime Cloud Cover Description	Nighttime Cloud Cover Description
0% to 5%	"Sunny" or "Clear"	"Clear"
6% to 25%	"Sunny" or "Mostly Clear"	"Mostly Clear"
26% to 50%	"Mostly Sunny" or "Partly Cloudy"	"Partly Cloudy"
51% to 69%	"Partly Sunny" or "Mostly Cloudy"	"Mostly Cloudy"
70% to 87%	"Mostly Cloudy" or "Considerable Cloudiness"	"Mostly Cloudy" or "Considerable Cloudiness"
88% to 100%	"Cloudy" or "Overcast"	"Cloudy" or "Overcast"

Note: Cloud cover description is not always used when chance of precipitation is over 60% because sky is assumed to be cloudy or mostly cloudy.

As you can see on the 51% to 69% line in the chart above, "Partly Sunny" and "Mostly Cloudy" could refer to the exact same sky condition, but "Mostly Cloudy" is a broader term that could be used day or night and through a wider range of cloud cover percentages.

### Examples

An example of two different wordings that could mean the exact same thing:

Thursday... **Mostly cloudy**, with a high near 39. Breezy.

Thursday... **Partly Sunny**, with a high near 39. Breezy.

An example where cloudy conditions are assumed because of the high chance of precipitation:

Wednesday... **Snow showers**. High near 32. Breezy. **Chance of precipitation is 80%**. New snow accumulation of 1 to 3 inches possible.

## How many different types of precipitation are there?

Many different types of precipitation affect northern Arizona. Some of them are rare in this area, while others are considerably more common at certain times of the year. Below are the basic precipitation types that you may see.

**Drizzle:** Very small (diameters of less than 0.02”), numerous, and uniformly distributed water drops that may appear to float while following air currents.

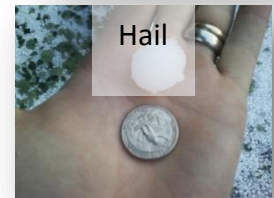
**Freezing Rain/Drizzle:** Rain/drizzle that falls in liquid form but freezes on contact to form a coating of glaze on the ground and on other exposed surfaces. It occurs when rain falls into a relatively shallow sub-freezing layer near the ground. It can be quite damaging due to the accumulated weight on trees, powerlines, and other surfaces. Rare in northern Arizona, but occasionally seen in the Little Colorado River Valley.



**Graupel (snow pellets):** A type of snow that falls as relatively round pellets of snow. They are distinguished from hail in that they are soft and opaque, and smaller than 5 mm (1/5<sup>th</sup> inch) in diameter. They form in vigorous cloud updrafts where liquid water droplets accrete onto snow crystals and freeze. Common in northern Arizona, especially in the higher elevations during spring and fall.



**Hail:** Pieces of ice ranging in size from smaller than the size of peas to the size of baseballs or larger. Often irregularly shaped, especially in larger hail. Hail is formed in vigorous thunderstorm updrafts where subfreezing water droplets accumulate onto an ice particle, thus growing the nucleus in size. Hail is suspended in the updraft until it grows large enough to fall out. Common in stronger thunderstorms during the summer, but usually very localized.



**Ice pellets:** See sleet.

**Rain:** Liquid precipitation. In general, drop diameters should be above 1/50<sup>th</sup> of one inch to qualify as rain. Smaller drops can qualify as rain if, in contrast to drizzle, they do not appear to float while following air currents.

**Rain Showers:** Intermittent, short duration rainfall over a localized area. May be light, moderate, or heavy.

**Sprinkles:** Scattered droplets of rain too light to be measured.

**Sleet (ice pellets):** Frozen raindrops which usually bounce when hitting a hard surface and do not stick to exposed surfaces. Sleet forms when rain falls through a sub-freezing layer deep enough to freeze the rain droplets.

**Snow:** Frozen precipitation composed of ice crystals. Snow forms when water vapor turns directly into ice crystals by a process called deposition. Snow flakes grow larger by aggregation, or “sticking together”, and riming, or “cloud droplets freezing onto the snowflake”. Cloud temperatures between around -5 °F to 15 °F cause the fastest ice crystal growth.



**Snow Flurries:** Intermittent, short duration snowfall with little or no accumulation.

**Snow Grains:** Very small, white, opaque grains of ice; the solid equivalent of drizzle.

**Snow pellets:** See graupel.

**Snow Showers:** Intermittent, short duration snowfall over a localized area, with possible accumulation.